Appln. No. 09/742,157
Amendment dated July 9, 2004

PATENT

REMARKS/ARGUMENTS

The Examiner has rejected all claims under Sections 102 and/or 103. This rejection is respectfully traversed.

This invention provides a storage system which connects to a computational resource (e.g., a host computer, another storage system, or other similar apparatus through a communication link). The invention allows resources such as storage resources or data path resources to be allocated to the computational resource based upon the data rate capability of storage resources in the storage system and/or the data rate capability of the communication link to achieve a desired quality of service. In the present invention, the allocation process is preferably performed by being chosen from a set of resources, at least one of which has the desired data rate capability.

The *Eshel* reference (U.S. 5,940,840) discloses the use of phantom files for dynamic read bandwidth measurements of computer disks. Upon measuring a read bandwidth, a new file must be read, but this can be time consuming for large files.

In the claimed invention metadata blocks are created for this purpose. These metadata blocks contain pointers to actual data blocks of phantom files. Their sizes are usually much smaller than the data blocks. The data blocks for phantom files are not actually written on disks because the contents of phantom files do not affect read bandwidth measurement. Instead, predetermined workload requirements are used to evaluate if maximum disk performance can meet the requirements.

The differences between the present invention and *Eshel* are at least fourfold: the purpose served, the resources allocated, the method by which they are reallocated, and the role of workload requirements.

With regard to the purpose of the invention, *Eshel* discloses methods to measure read bandwidth performance of given disks. In contrast, this invention discloses methods to choose a system configuration consisting of ports, disks and their combinations to guarantee the required performance.

Regarding the resources allocated, the resources to be allocated in *Eshel* are only data blocks on disks. The resources to be allocated in this invention are ports, storage disks and their combination.

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Regarding the method of allocation, the Examiner mentions in the Action that *Eshel* discloses resource allocation technology based on not only a data rate capability of storage resources in a storage system, but also a data rate capability of a communication link. There is, however, no communication link for such use of connecting a computational resource and a storage system as recited by the claims herein.

Even if File system computer (510) and Disks (580) in *Eshel* are considered the computational resource and the storage system respectively, the data rate capability of the communication link between 510 and 580 is not considered for resources allocation. This is because *Eshel* mentions that communication links do not become bottlenecks for measuring disk read bandwidth.
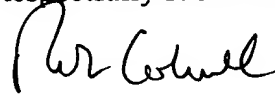
Regarding usage and the role of workload requirements, *Eshel* discloses methods to measure read bandwidth using data rate requirements. This data rate is used to determine if the maximum disk speed meets the requirements. *Eshel* does not provide any method to meet the data rate requirements - it cannot guarantee a data rate. In contrast, here the assignment is determined based on the flowchart shown in Figure 3 which utilizes user requirements, performance of communication links (Figure 4) and disks (Figures 5, 6, and 7) to guarantee required data rate.

The *Wakamiya* reference discloses a service offering system in response to requests for services, having a module drive section. The module drive section allocates prescribed resource quantity based on the implementing class of the service and drives a service module corresponding to the service. This is not storage-related invention. There is no description of how to practically allocate which hardware or software resources, e.g., how to (i) allocate resources based upon a data rate capability "both of" storage resources and a communication link (claim1), (ii) allocate at least one of storage resources which have different data rate capability, based upon a data rate capability of communication link (new claim22).

In view of the foregoing, counsel for Assignee believes all claims now pending in this application are in condition for allowance. The issuance of a Notice of Allowance is respectfully requested.

If the Examiner believes a telephone conference would expedite prosecution of this application, he is invited to telephone the undersigned at 650-326-2400.

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Respectfully submitted,

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